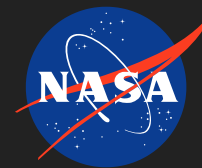


# Methane Origin Instrument (MOI): Methane Isotope and Hydrocarbon Analyzer for Mars Exploration, Phase I

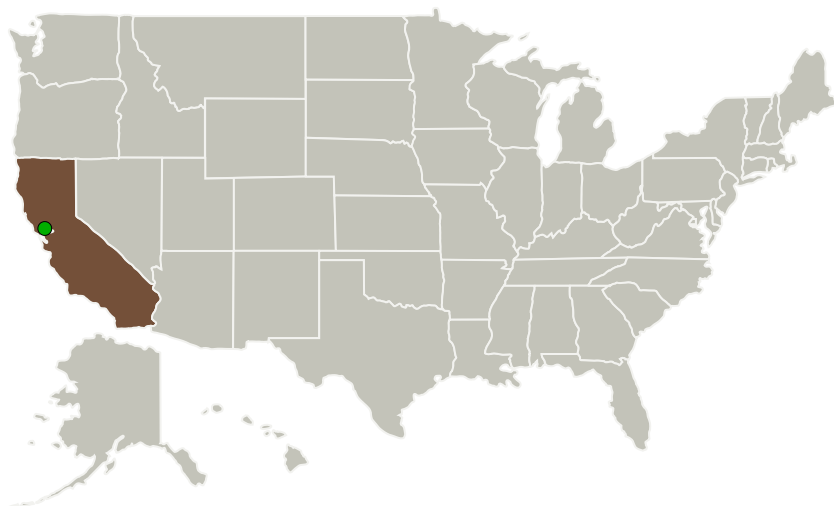
Completed Technology Project (2012 - 2012)



## Project Introduction

In this Small Business Innovative Research (SBIR) effort, Los Gatos Research (LGR) proposes to employ mid-infrared Off-Axis Integrated Cavity Output Spectroscopy (Off-Axis ICOS) to develop a compact, rugged analyzer to quantify low concentrations of  $^{12}\text{CH}_4$  (methane),  $^{13}\text{CH}_4$  (delta  $^{13}\text{C}$  of methane),  $\text{C}_2\text{H}_6$  (ethane),  $\text{C}_3\text{H}_8$  (propane), and  $\text{C}_4\text{H}_{10}$  (butane) in the gas phase. This portable instrument will provide rapid (0.1 – 1 Hz), highly-accurate quantification of these gasses with minimal external calibration or consumables. The target accuracies for the measured species are  $[\text{CH}_4]$  to better than plus or minus 0.05 – 0.1 ppbv, delta  $^{13}\text{C}$  of ambient  $\text{CH}_4$  to better than plus or minus 0.5 – 1 and 00 over 100,  $[\text{C}_2\text{H}_6]$  to better than plus or minus 0.05 – 1 ppbv,  $[\text{C}_3\text{H}_8]$  to better than plus or minus 0.1 – 1 ppbv, and  $[\text{C}_4\text{H}_{10}]$  to better than plus or minus 0.1 – 5 ppbv. The resulting instrument will allow researchers in NASA's Space Science and Astrobiology Division to perform field measurements of methane and other hydrocarbons in order to better discriminate between biotic and abiotic methane production. These studies are widely applicable to the exploration of Mars, and the technology can be miniaturized to address this critical NASA need. These in-situ terrestrial measurements also provide valuable high-resolution data for the calibration of remote sensing instruments.

## Primary U.S. Work Locations and Key Partners



Methane Origin Instrument (MOI): Methane Isotope and Hydrocarbon Analyzer for Mars Exploration, Phase I

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Organizations Performing Work	Role	Type	Location
Los Gatos Research	Lead Organization	Industry	Mountain View, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California

## Project Transitions

**February 2012:** Project Start**August 2012:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138298>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Los Gatos Research

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Douglas S Baer

**Co-Investigator:**

Douglas Baer

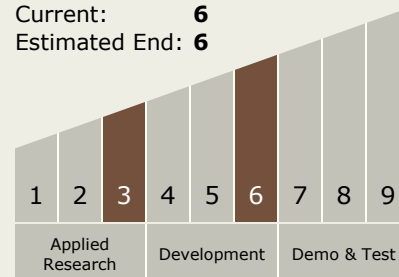
# Methane Origin Instrument (MOI): Methane Isotope and Hydrocarbon Analyzer for Mars Exploration, Phase I

Completed Technology Project (2012 - 2012)



## Technology Maturity (TRL)

Start: **3**  
Current: **6**  
Estimated End: **6**



## Technology Areas

### Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System